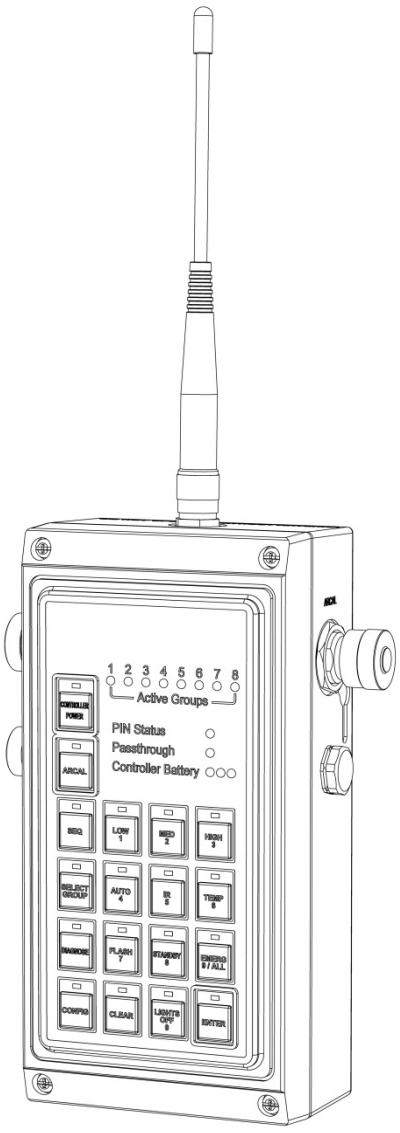
Handheld Controller

USER MANUAL



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1.0 Safety & Usage

The following symbols indicate important safety warnings and precautions throughout this manual:

WARNING indicates that serious bodily harm or death may result from failure to adhere to the precautions.

CAUTION indicates that damage to equipment may result if the instructions are not followed.

NOTE suggests optimal conditions and provides additional information.

WIRELESS feature or function.

INTERACTION with the controlled product is required for this feature or function.

1.1 Battery Precautions

Use extreme caution when handling the battery. This product is capable of generating enormous short-circuit currents. Remove all jewelry (bracelets, metal-strap watches, rings) before attempting to handle or remove the battery.

Charge your battery periodically. Permanent damage and reduced capacity will result if the battery is not correctly maintained.

The rate of battery self-discharge is very dependent upon temperature. The warmer the temperature, the faster the batteries will discharge.

1.2 Wireless Precautions

Keep the Handheld Controller at a distance of at least 3 ft. (1 m) from the antennas of controlled products or other Handheld Controllers. It sends out a powerful radio signal that could damage sensitive receiver circuitry if operated at close range.

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1.3 Regulatory

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications; however, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off or on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna;
- Increase the separation between the equipment and receiver;
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected;
- Consult the dealer or an experienced radio/TV technician for help.

This Class [B] digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe [B] est conforme à la norme NMB-003 du Canada.

1.4 Warranty Disclaimer

This manual will familiarize you with the features and operating standards of the product. Failure to comply with the use, storage, maintenance, or installation instructions detailed in this manual could void the user warranty.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. Installation work must be done by a qualified person(s) in accordance with all application local codes and standards.

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2.0 Introduction

2.1 Features

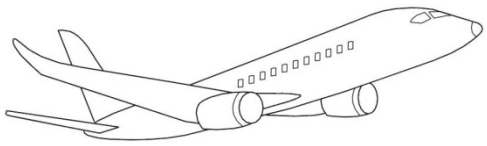
The Handheld Controller has the following features:

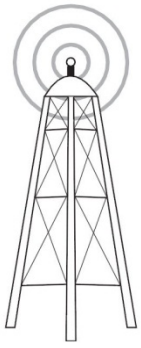
- Wireless control range of up to 2.5 miles (4 km) of many products
- Sealed, rugged aluminum case with backlit keypad and MIL-spec connectors
- Controls up to 8 independent groups of products
- Advanced ARCAL, configuration, and diagnosis commands
- Administrator and User password controls
- Encrypted signal
- Rechargeable lithium ion battery pack

2.2 Applications

The Handheld Controller can wirelessly operate a wide range of controlled products:

- A700 Series — Runway edge, threshold, taxiway & apron edge, helipad, emergency airfield, construction barricade, obstruction
- A650 — Taxiway & apron edge, helipad, emergency airfield, construction barricade, obstruction
- Wind Cone + SEPS — Wind cone with a Solar Engine Power Supply (SEPS)
- Sign + SEPS — Guidance or distance remaining sign with a Solar Engine Power Supply (SEPS)
- ERGL + SEPS — Elevated runway guard light (ERGL) with a Solar Engine Power Supply (SEPS)
- PAPI — Precision approach path indicator





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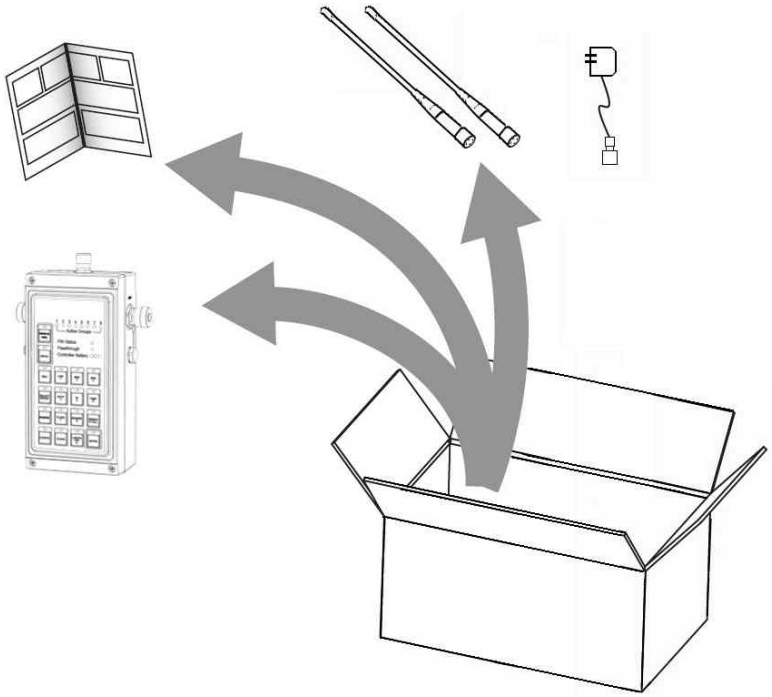
3.0 Installation

Each shipment includes:

- Handheld Controller
- Manual
- Two antennas
- Battery charger



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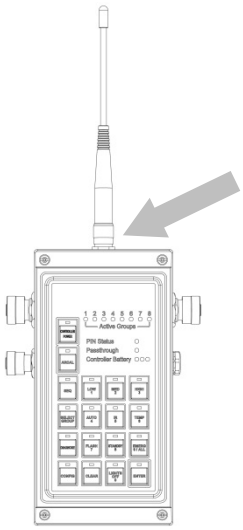
3.1 Antenna

Do not operate the Handheld Controller without the antenna fully engaged.

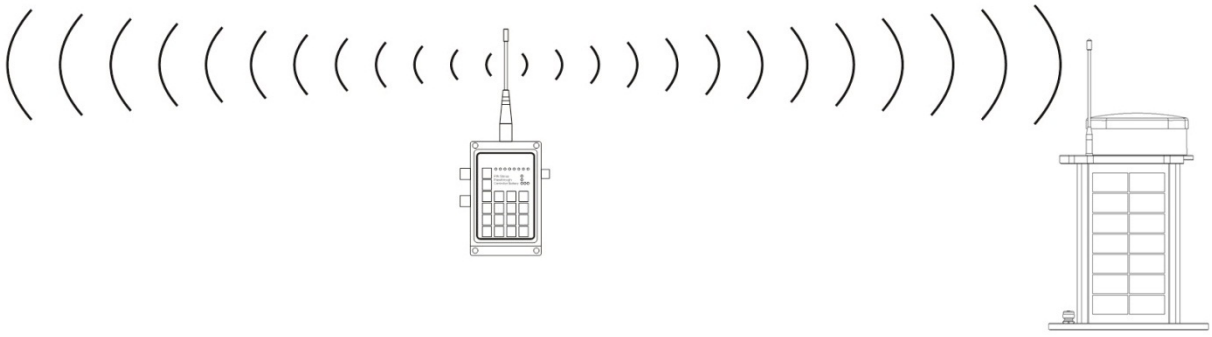
Failure to do so will permanently damage the unit.

Grip the antenna by its metal base and hand-tighten it onto the antenna connector.



The effective range of the wireless control system is 2.5 miles (4 km). Wireless range is greatly affected by use and location. To achieve the best wireless range:

- Handheld Controller antenna is parallel to the controlled product's antenna



- Elevate the Handheld Controller's antenna
- Ensure surrounding grass and foliage is trim
- Clear line-of-sight between antennas

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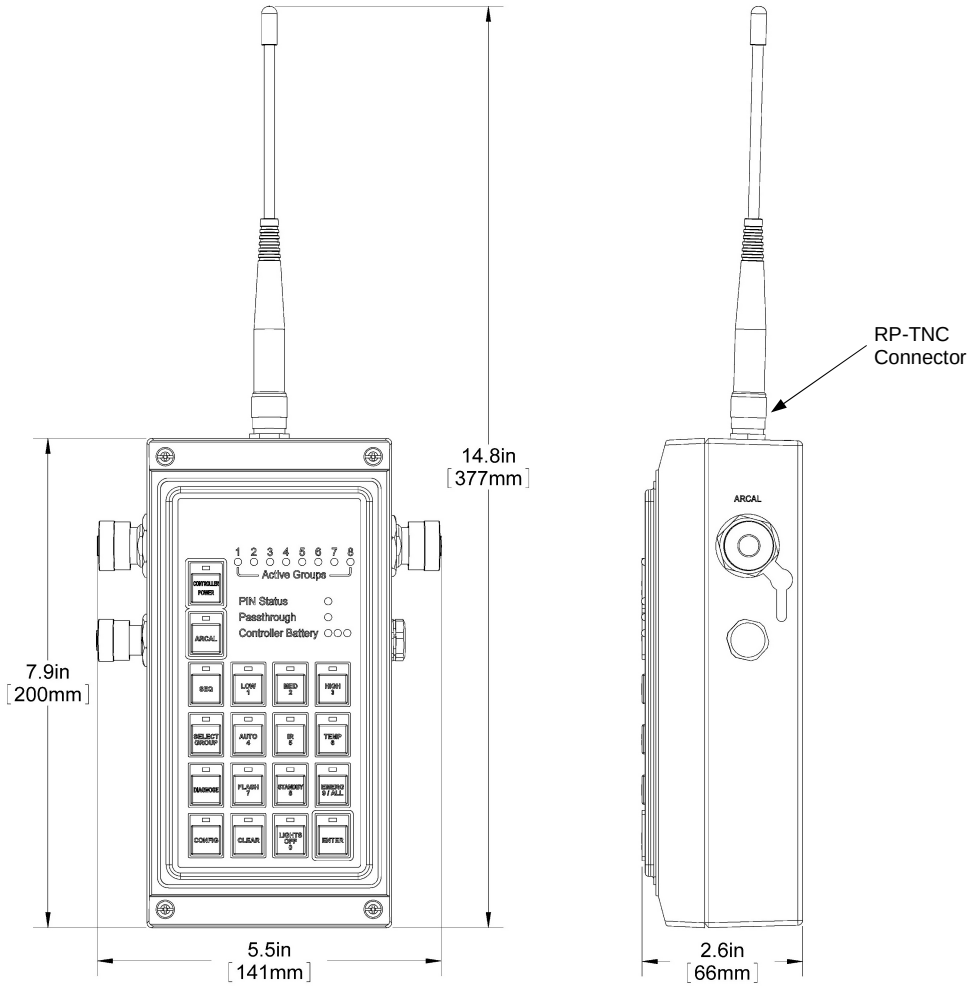
3.2 Mounting

The Handheld Controller is portable, outdoor-rated, and does not require any special mounting. For some applications, though, the antenna can be remote mounted using shielded coaxial cable.



4.0 Operation

4.1 Theory of Operation

The Handheld Controller contains radio that transmits commands to a receiving radio inside a controlled product. The controlled product operates in one of several modes. The most commonly used are Autonomous and Temporary Modes. For more details on the modes and features specific to a controlled product, see that product's manual.

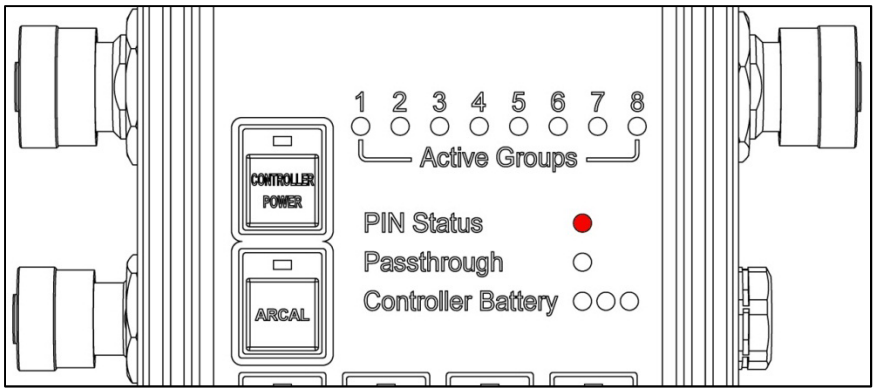
4.2 Features

4.2.1 Turning On and Off

To turn on the Handheld Controller:

- Press **CONTROLLER POWER**

All indicators illuminate for 3 sec. If the PIN Status indicator is red, the Handheld Controller is locked.



To unlock the controller, enter a personal identification number (PIN):

- Press **1 2 3 ENTER** User
  PIN Status indicator is off
  Turns off and locks after 60 min. of inactivity
  Normal operation

- Press **7 8 9 ENTER** Administrator
  PIN Status indicator flashes red
  Turns off and locks after 10 min. of inactivity
  CONFIG indicator is green
  PIN management
  UCS management
  ARCAL configuration

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The keypad and indicators dim after 30 sec. of inactivity. To restore them:

- Press any key

The Handheld Controller enters standby to conserve power after 1 min. of inactivity. To exit standby:

- Press **CONTROLLER POWER**

To turn off the controller:

- Press and hold **CONTROLLER POWER**
- Keypad and indicators turn off

NOTE To switch between User and Administrator, turn off and on the controller.

4.2.2 Changing PINs (Administrator feature)

NOTE User and Administrator PINs must be different.

To change the User PIN:

1. Unlock the controller using the Administrator PIN
2. Press **1** (1 indicator starts flashing)
3. Press **ENTER** (1 indicator turns on)
4. Enter new PIN using numeric keys (3 – 8 digits in length)
    - Active Groups indicators will turn on indicating how many digits have been entered
5. Press **ENTER**
    - ENTER indicator will turn green indicating an acceptable PIN or red indicating the PIN does not have enough digits
6. Re-enter the new PIN a second time to confirm
    - Active Groups indicators will turn off as the PIN is entered
7. Press **ENTER**
    - If both PINs match then the ENTER indicator will briefly turn green
    - If the PINs do not match, or the PIN is the same as the Administrator PIN, the ENTER indicator will briefly turn red and you will need to start again

To change the Administrator PIN:

1. Unlock the controller using the Administrator PIN
2. Press **2** (2 indicator starts flashing)
3. Press **ENTER** (2 indicator turns on)
4. Enter new PIN using numeric keys (3 – 8 digits in length)
    - Active Group indicators turn on showing how many digits have been entered

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5. Press **ENTER**
    - ENTER indicator will turn green indicating an acceptable PIN or red indicating the PIN does not have enough digits
6. Re-enter the new PIN a second time to confirm
    - Active Group indicators turn off as the PIN is entered
7. Press **ENTER**
    - If both PINs match then the ENTER indicator will briefly turn green
    - If the PINs do not match, or the PIN is the same as the User PIN, the ENTER indicator will briefly turn red and you will need to start again

Using the CLEAR key during Changing PIN:

- If the CLEAR key is pressed and no PIN digits have been entered, the controller will return to Administrator mode with no Administrator operations selected
- If the CLEAR key is pressed and at least one PIN digit has been entered, the controller will return to the start of the Changing PINs operation

4.2.3 Resetting PINs (Administrator feature)

This operation will reset the User and Administrator PINs to factory defaults:

1. Unlock the controller using the Administrator PIN
2. Press **3** (3 indicator starts flashing)
3. Press **ENTER** (3 indicator turns off)
    - The ENTER indicator will turn green for a correct operation or red for an incorrect operation

4.2.4 Display

The keypad and indicators can be set to different illumination options.

Pressing and holding the **CONFIG** key cycles through:

1.	Dim indicators	keypad backlight	dark nighttime conditions
2.	Dim indicators	no keypad backlight	
3.	Bright indicators	no keypad backlight	bright daytime conditions

4.2.5 Clear

To deselect all keypad selections since **ENTER** was last pressed:

- Press **CLEAR**
- Indicators then display the current mode of the Active Group(s)

4.2.6 Battery Diagnose

Battery Diagnose sends a command to the controlled product to display its battery state of charge. Each controlled product will respond independently.

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NOTE PAPI does not respond to battery diagnose commands.

1. The controlled product should not be in a flashing mode because it will be difficult to decipher its Battery Diagnose response.
2. Press **DIAGNOSE** (DIAGNOSE indicator starts flashing)
3. Press **ENTER** (DIAGNOSE indicator turns on)

NOTE Each controlled product will respond to only one of the below 4 commands.

No response to a command means that the battery is not in that state of charge range.

NOTE If a controlled product's output is IR, night visions goggles (NVG) are required to view the Battery Diagnose response.

Handheld Controller Key Sequence	Battery State of Charge	Controlled Product Response
4. Press **LIGHTS OFF ENTER**	LVD, < 5%	5 – 7 flashes, A704-5 and SEPS Radio is turned off in the A704-H and A650 Wireless to save power; they will not respond to this command
5. Press **LOW ENTER**	Low, 5 – 50%	5 – 7 flashes
6. Press **MED ENTER**	Charge, 50 – 75%	5 – 7 flashes
7. Press **HIGH ENTER**	Good, 75 – 100%	5 – 7 flashes

To exit Battery Diagnose:

1. Press **DIAGNOSE** (DIAGNOSE indicator starts flashing)
2. Press **ENTER** (DIAGNOSE indicator turns off)

4.2.7 Grouping

Grouping allows independent control of different subsets of wirelessly controlled products on an airfield:

- There are 8 groups, numbered 1 through 8
- Factory default for controlled products is group 1
- Each controlled product can be assigned to only one group
- Handheld Controller can control multiple or all groups at a time
- A controlled product can be reassigned to another group as required

NOTE The Handheld Controller only sends wireless commands to the groups indicated by the Active Groups indicators.

Controlled products not in the Active Groups will not respond to Handheld Controller commands.

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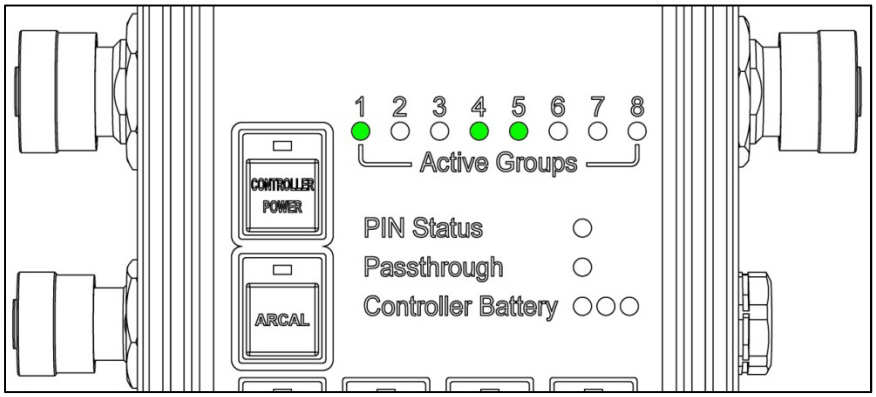
In this example, the Active Groups are 1, 4, and 5:



To choose the Active Groups:

1. Press **SELECT GROUP**
2. Press **1** through **8** to select group number(s)
    - As an alternative, press **9 / ALL** to select all 8 groups
3. Press **ENTER**

To choose which controlled products are part of a group:

1. Controlled product must be powered for at least 10 sec. and not in Storage Mode
2. Manually instruct the controlled product to accept grouping configurations from the Handheld Controller for 5 min.:

• A700 Series	Press the push button once
• A650	Switch must be ON for at least 10 sec., then slide the switch OFF and then ON within 10 sec.
• SEPS	Press the push button once; top cover needs to be open to access push button
• PAPI	Press the push button once; control panel door must be open to access push button Due to its critical importance as a navigation aid, the PAPI should be on its own separate group.

3. Press **CONFIG** (CONFIG indicator starts flashing)
4. Press **ENTER** (CONFIG and SELECT GROUP indicators turn green)
5. Press **1** through **8** to select group number
6. Press **ENTER**
    - Handheld Controller transmits group number to only the products manually instructed above
    - Controlled product just added and existing members of this group flash to indicate acceptance of command
    - Handheld Controller transmits this group's last operating mode to all products in this group
    - 5 min. window of accepting grouping configurations is ended for controlled products

When you are finished configuring groups, exit CONFIG by:

1. Press **CONFIG** (CONFIG indicator starts flashing)
2. Press **ENTER** (CONFIG and SELECT GROUP indicators turn off)

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NOTE When you add controlled products to a group, products already part of that group are not affected. In this way, you can add to a group as you go without having to re-assign all products in that group.

4.2.8 Unique Code Sequence (Administrator feature)

Unique Code Sequence (UCS) allows one or more Handheld Controllers to be uniquely associated to one or more controlled products. When UCS is enabled, the Handheld Controller sends a code with each radio transmission. Only controlled products configured to accept that particular code will respond to the transmission. The benefits are:

Independence	Nearby installations of controlled products can be operated independently by different Handheld Controllers without interference.
Security	It is not possible for another Handheld Controller to interrupt airfield operation.

NOTE The Handheld Controller cannot control UCS configured and non-UCS configured products at the same time.

Only one UCS at a time can be stored by a Handheld Controller or controlled product.

NOTE There is no way to retrieve a UCS once it has been removed or replaced with a new UCS. It is recommended that the UCS is transmitted to a backup Handheld Controller.

Configuring an airfield for UCS involves the following operations:

- Initialization — generate an initial UCS in the Handheld Controller and transmit it to non-UCS products
- Addition — add one or more products to an existing UCS-configured airfield
- Re-keying — generate a new UCS and transmit it to an older UCS-configured airfield
- Removal — remove the UCS from the Handheld Controller and controlled products
- Reception — transmit a UCS from one Handheld Controller to another Handheld Controller

Initialization

The Handheld Controller and controlled products arrive from the factory with UCS removed. To initialize an airfield with a UCS:

1. Unlock the controller using the Administrator PIN
2. Press **7** (7 indicator starts flashing)
3. Press **ENTER** (7 indicator turns off)
    - A new UCS has been generated; it is not saved until it is transmitted to the controlled products

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4. Controlled product must be powered for at least 10 sec. and not in Storage Mode. Manually instruct the controlled product to accept UCS configurations from the Handheld Controller for 5 min.:
    - A700 Series — Press the push button once
    - A650 — Switch must be ON for at least 10 sec., then slide the switch OFF and then ON within 10 sec.
    - SEPS — Press the push button once; top cover needs to be open to access push button
    - PAPI — Press the push button once; control panel door must be open to access push button
5. Unlock the controller using the Administrator PIN, if it is not already so
6. Press **9** (9 indicator starts flashing)
7. Press **ENTER** (9 indicator turns on)
    - Every time ENTER is pressed, the UCS is transmitted
    - Each controlled product that receives the UCS will flash 5 – 7 times
8. Press **CLEAR** to exit this UCS transmission operation

Addition

To add controlled products to an existing UCS-configured airfield:

1. Controlled product must be powered for at least 10 sec. and not in Storage Mode. Manually instruct the controlled product to accept UCS configurations from the Handheld Controller for 5 min.:
    - A700 Series — Press the push button once
    - A650 — Switch must be ON for at least 10 sec., then slide the switch OFF and then ON within 10 sec.
    - SEPS — Press the push button once; top cover needs to be open to access push button
    - PAPI — Press the push button once; control panel door must be open to access push button
2. Unlock the controller using the Administrator PIN
3. Press **9** (9 indicator starts flashing)
4. Press **ENTER** (9 indicator turns on)
    - Every time ENTER is pressed, the UCS is transmitted
    - Each controlled product that receives the UCS will flash 5 – 7 times
5. Press **CLEAR** to exit this UCS transmission operation

NOTE

This procedure applies to both UCS and non-UCS controlled products.

Products already on this transmitted UCS will flash in response to their UCS being re-transmitted.

Re-keying

Re-keying allows a new UCS to be generated and transmitted to products that are already UCS-configured. To re-key an airfield:

1. Unlock the controller using the Administrator PIN
2. Press **7** (7 indicator starts flashing)

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3. Press **ENTER** (7 indicator turns off)
    - A new UCS has been generated; it is not saved until it is transmitted to the controlled products
4. Press **9** (9 indicator starts flashing)
5. Press **ENTER** (9 indicator turns on)
    - Every time ENTER is pressed, the UCS is transmitted
    - Each controlled product that receives the UCS will flash 5 – 7 times
6. Press **CLEAR** to exit this UCS transmission operation

Removal

The following procedure removes the UCS in the Handheld Controller and the UCS-configured products:

1. Unlock the controller using the Administrator PIN
2. Press **0** (0 indicator starts flashing)
3. Press **ENTER** (0 indicator turns off)
    - This removes the UCS from the Handheld Controller
    - The removed UCS is not saved, though, until a UCS transmission occurs; therefore, if UCS is removed unintentionally it will not affect the current UCS
4. Controlled product must be powered for at least 10 sec. and not in Storage Mode. Manually instruct the controlled product to accept UCS configurations from the Handheld Controller for 5 min.:
    - A700 Series — Press the push button once
    - A650 — Switch must be ON for at least 10 sec., then slide the switch OFF and then ON within 10 sec.
    - SEPS — Press the push button once; top cover needs to be open to access push button
    - PAPI — Press the push button once; control panel door must be open to access push button
5. Unlock the controller using the Administrator PIN, if it is not already so
6. Press **9** (9 indicator starts flashing)
7. Press **ENTER** (9 indicator turns on)
    - Every time ENTER is pressed, the UCS removal command is transmitted
    - Each controlled product that receives the UCS removal will flash 5 – 7 times
8. Press **CLEAR** to exit this UCS removal operation

Reception

Reception allows one Handheld Controller to transmit a UCS to another Handheld Controller. There is no way to retrieve a UCS once it has been removed or replaced with a new UCS. It is recommended that the UCS is transmitted to another Handheld Controller for backup, emergency, or loss of the primary controller. In the below steps:

- Handheld Controller A — transmitting the UCS — primary
- Handheld Controller B — receiving the UCS — backup

1. Unlock both controllers using the Administrator PIN
2. Press **8** (8 indicator starts flashing) on Handheld Controller B

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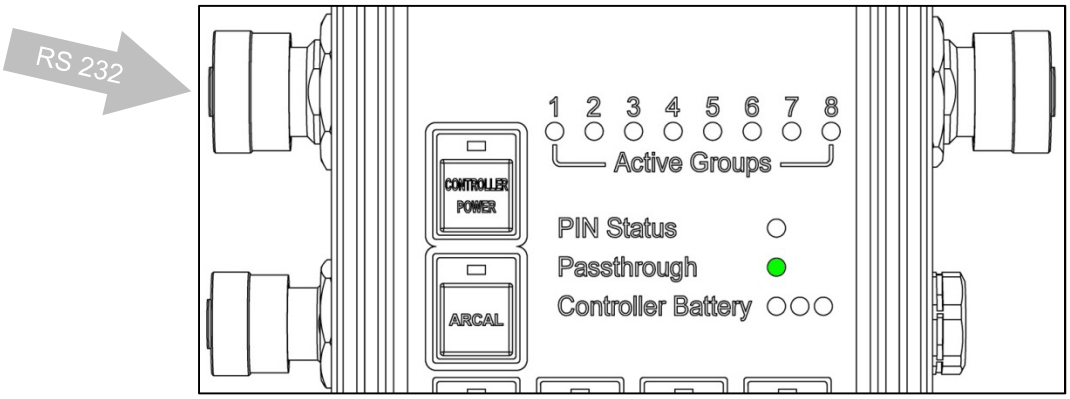
3. Press **ENTER** (8 indicator turns off) on Handheld Controller B
    - Handheld Controller B is now waiting to receive a UCS transmission from Handheld Controller A
4. Press **9** (9 indicator starts flashing) on Handheld Controller A
5. Press **ENTER** (9 indicator turns on) on Handheld Controller A
    - ENTER indicator briefly turns green on Handheld Controller B to indicate the UCS was received
6. Press **CLEAR** on Handheld Controller A to exit this UCS transmission operation

Both Handheld Controllers are now programmed with the same UCS and either can be used to control products configured with that same UCS.

4.2.9 Passthrough

Passthrough is used to send commands to the Handheld Controller via the RS 232 connector. This feature is used for personal computer (PC) and control tower interface integration. When Passthrough is active, its indicator is green:

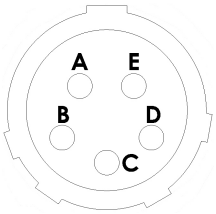


NOTE

Battery charger or external power must be supplied to the POWER connector since the Handheld Controller does not turn off when Passthrough is active.

See Storage & Battery Charging section for POWER connector details.

Connect a communication harness to the RS 232 connector on the Handheld Controller:



PIN A: RXD
Receive data

PIN E: GROUND

PIN B: RTS
Ready to send

PIN D: DTR
Data terminal ready

PIN C: TXD
Transmit data

- MS3116 connector detailed in MIL-DTL-26482 (approved vendor: Amphenol PT06E-10-5P(SR)(025))
- Connector accepts 24 – 20 AWG stranded wire

Please contact your distributor for details on the command protocol required for the above RS 232 communication and operation of the Handheld Controller during Passthrough.

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4.2.10 Factory Reset

Factory Reset returns the Handheld Controller to its factory default settings. All PINs are reset, its local UCS is reset, and UCS is then disabled for only the Handheld Controller.

NOTE

UCS settings are NOT removed from each controlled product.

UCS can be reset/disabled on a controlled product by performing its own factory reset procedure.

To perform a Factory Reset:

1. Press and hold **CONTROLLER POWER** to turn the Handheld Controller off
2. Press **CONTROLLER POWER** to turn the Handheld Controller on (PIN Status indicator turns red)
3. Enter the Factory Reset code: **1223334444**
4. Press **ENTER**
    - Keypad and indicators turn on and then off indicating a successful Factory Reset

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4.3 Modes

4.3.1 Autonomous Mode

In Autonomous Mode, the controlled product turns on during the night and turns off during the day. The change from day-to-night or night-to-day is known as a transition. Each controlled product detects transitions.

The Autonomous Mode setting is selected by the Handheld Controller:

Controlled Product Setting	Handheld Controller Key Sequence	PAPI Response
AUTO LOW	Press **AUTO LOW ENTER**	LOW (Visible)
AUTO MED	Press **AUTO MED ENTER**	HIGH (Visible)
AUTO HIGH	Press **AUTO HIGH ENTER**	HIGH (Visible)
AUTO LOW IR	Press **AUTO LOW IR ENTER**	INFRARED
AUTO MED IR	Press **AUTO MED IR ENTER**	INFRARED
AUTO HIGH IR	Press **AUTO HIGH IR ENTER**	INFRARED
AUTO LOW FLASH	Press **AUTO LOW FLASH ENTER**	LOW (Flash not supported)
AUTO MED FLASH	Press **AUTO MED FLASH ENTER**	HIGH (Flash not supported)
AUTO HIGH FLASH	Press **AUTO HIGH FLASH ENTER**	HIGH (Flash not supported)
AUTO LOW IR FLASH	Press **AUTO LOW IR FLASH ENTER**	INFRARED (Flash not supported)
AUTO MED IR FLASH	Press **AUTO MED IR FLASH ENTER**	INFRARED (Flash not supported)
AUTO HIGH IR FLASH	Press **AUTO HIGH IR FLASH ENTER**	INFRARED (Flash not supported)

The IR and FLASH keys are toggles. Press them once to select and a second time to deselect.

NOTE

In AUTO modes, the PAPI will stay in the desired mode until Lights Off Mode is sent from the Handheld Controller.

PAPI does not time out, monitor battery states, or check for ambient brightness condition.

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4.3.2 Temporary Mode

A Temporary Mode activation interrupts other modes and ignores transitions. This activation lasts for a preset time and then the controlled product reverts to its previous Autonomous Mode. This preset time is specific to each controlled product and is not stored in the Handheld Controller.

The Temporary Mode setting is selected by the Handheld Controller:

Controlled Product Setting	Handheld Controller Key Sequence
TEMP LOW	Press **TEMP LOW ENTER**
TEMP MED	Press **TEMP MED ENTER**
TEMP HIGH	Press **TEMP HIGH ENTER**
TEMP LOW IR	Press **TEMP LOW IR ENTER**
TEMP MED IR	Press **TEMP MED IR ENTER**
TEMP HIGH IR	Press **TEMP HIGH IR ENTER**
TEMP LOW FLASH	Press **TEMP LOW FLASH ENTER**
TEMP MED FLASH	Press **TEMP MED FLASH ENTER**
TEMP HIGH FLASH	Press **TEMP HIGH FLASH ENTER**
TEMP LOW IR FLASH	Press **TEMP LOW IR FLASH ENTER**
TEMP MED IR FLASH	Press **TEMP MED IR FLASH ENTER**
TEMP HIGH IR FLASH	Press **TEMP HIGH IR FLASH ENTER**

The IR and FLASH keys are toggles. Press them once to select and a second time to deselect.

NOTE

PAPI does not respond to TEMP commands to turn on the device.

PAPI will change modes if already enabled in an AUTO MODE and a TEMP command is received.

For example, the PAPI is set to AUTO LOW, receives a TEMP LOW IR command, PAPI changes to IR mode It is recommended the PAPI be controlled on a separate group to avoid this issue.

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4.3.3 Standby Mode

Standby Mode turns off the output of the controlled product and waits for the next day-to-night transition. After this transition, the controlled product enters its previous Autonomous Mode.

1. Press **STANDBY**
2. Press **ENTER**

Standby Mode can be interrupted at any time by another Handheld Controller command.

NOTE PAPI responds to Standby Mode the same as Lights Off Mode; it has to be commanded back on.

4.3.4 Lights Off Mode

Lights Off Mode turns off the output of the controlled product indefinitely until it receives a command to turn its output on.

1. Press **LIGHTS OFF**
2. Press **ENTER**

Lights Off Mode can be interrupted at any time by another Handheld Controller command.

4.3.5 Emergency Mode

Emergency Mode sets all controlled products in all groups to an emergency flash:

1. Press **EMERG 9 / ALL** (EMERG 9 / ALL indicator turns on)
2. Press **ENTER**

Emergency Mode is equivalent to TEMP HIGH FLASH sent to all groups. After the controlled product's preset Temporary Mode activation time, the controlled products revert to their previous Autonomous Mode. To cancel Emergency Mode before this preset time:

1. Press **EMERG 9 / ALL** (EMERG 9 / ALL indicator turns off)
2. Press **ENTER**

NOTE PAPI will not flash in Emergency Mode, but stay on steady.

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4.3.7 ARCAL Mode (Administrator feature)

The Aircraft Radio Control of Aerodrome Lighting (ARCAL) feature allows aircraft pilots to turn on the airfield's wirelessly controlled products:

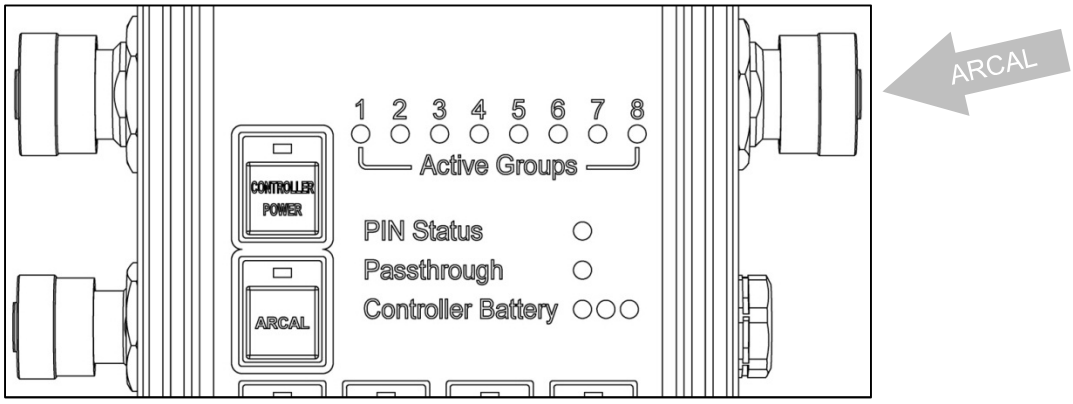
1. Pilot sends a wireless VHF transmission (microphone button clicks) to an ARCAL/L-854 VHF receiver
2. VHF receiver transmits the command to a Handheld Controller using a wiring harness
3. Handheld Controller transmits a wireless command to only the Active Groups of controlled products

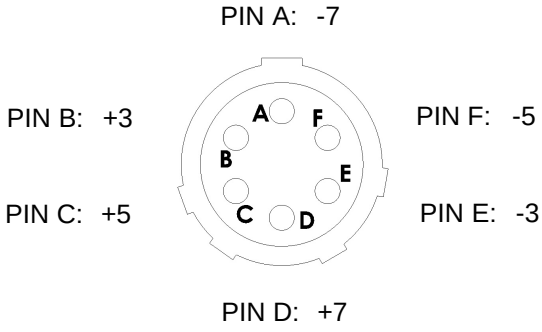
NOTE

Battery charger or external power must be supplied to the POWER connector since the Handheld Controller does not turn off in ARCAL mode.

See Storage & Battery Charging section for POWER connector details.

Connect an ARCAL/L-854 VHF receiver to the ARCAL connector on the Handheld Controller:





- MS3116 connector detailed in MIL-DTL-26482 (approved vendor: Amphenol PT06E-10-6P(470))
- Connector accepts 24 – 20 AWG stranded wire

VHF Receiver Output Channels	ARCAL Connector	
	Positive	Negative
3 click	Pin B: +3	Pin E: -3
5 click	Pin C: +5	Pin F: -5
7 click	Pin D: +7	Pin A: -7

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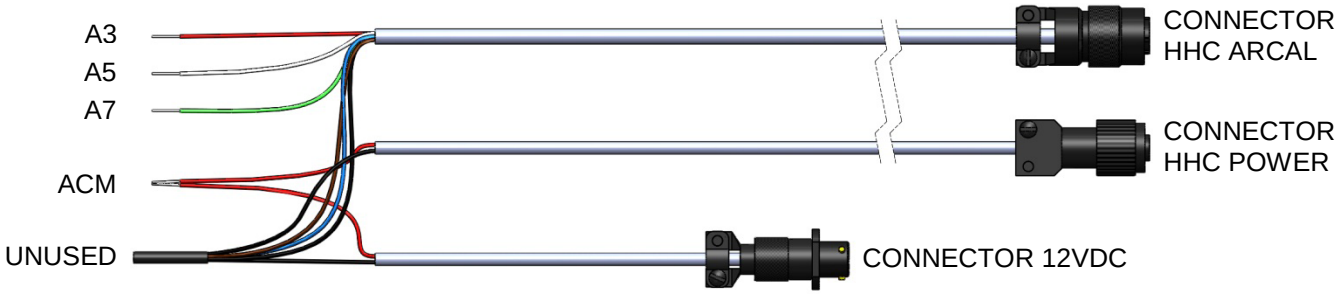
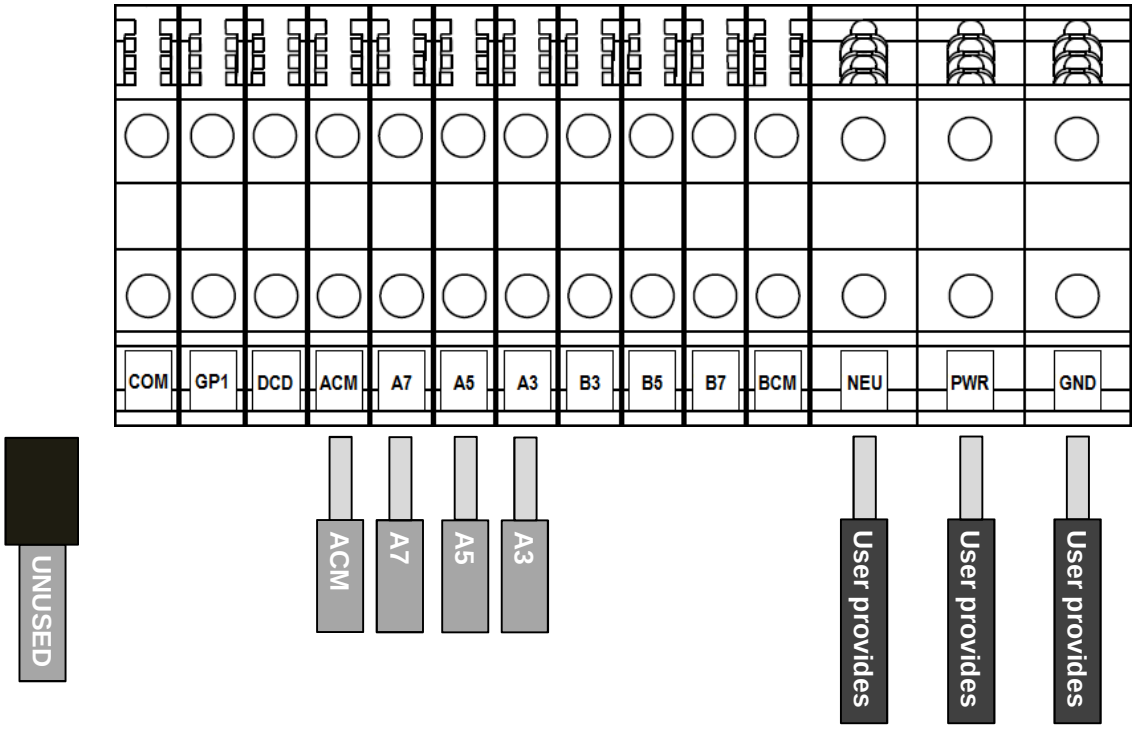
There is an optional harness kit available to simplify the ARCAL/L-854 + Handheld Controller integration:



1. Route loose wires of this harness inside ARCAL/L-854 receiver's electrical box
2. CONNECTOR 12VDC, CONNECTOR HHC POWER, and CONNECTOR HHC ARCAL all remain outside the box
3. Connect the loose wires to the terminal block inside the box. For most ARCAL/L-854 VHF receivers, the terminal block looks like:



4. Route electrical power to terminal blocks NEU, PWR, and GND. See your specific model for voltage and power supply requirements.
5. Use cable ties and cable tie holders to securely fixture the wiring inside the box
6. Connect CONNECTOR HHC POWER to Handheld Controller's POWER connector
7. Connect CONNECTOR HHC ARCAL to Handheld Controller's ARCAL connector
8. Connect CONNECTOR 12VDC to the battery charger included with the Handheld Controller; connect this battery charger to 100 – 240 VAC 50/60 Hz. The battery charger is not designed for wet conditions, so for outdoor installations:

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a. Route CONNECTOR HHC POWER and CONNECTOR HHC ARCAL down thru the box's wiring grommet and out to the Handheld Controller
b. Keep CONNECTOR 12VDC inside the box and connect to battery charger
c. Install the entire battery charger inside the box; use cable ties and holders to secure
d. Connect the battery charger to 100 – 240 VAC 50/60 Hz via outdoor-rated cabling

Please contact your distributor for details on the wiring connection to your specific ARCAL/L-854 VHF receiver.

The Handheld Controller must then be configured locally to enable ARCAL Mode:

1. Unlock the controller using the Administrator PIN
2. Press **ARCAL** (ARCAL indicator starts flashing)
3. Press **ENTER** (ARCAL indicator turns on)
    - All controlled products in the Active Groups are set to Lights Off Mode

The pilot can now remotely control the wireless products by clicking the aircraft's microphone button. This example is for an ARCAL type K or FAA L-854 Type I (air-to-ground) system:

Clicks within a 5 sec. period	Controlled Product Setting
3	TEMP LOW
5	TEMP MED
7	TEMP HIGH

After a preset time (set in the ARCAL/L-854 VHF receiver), the VHF receiver commands the Handheld Controller to transmit Lights Off Mode. The controlled products then turn off their outputs.

NOTE ARCAL Mode controls only the Active Groups. It cannot change or configure the Active Groups.

While in ARCAL Mode, the keypad is locked out and can only be used to exit ARCAL mode. To exit ARCAL mode:

1. Press **ARCAL** (ARCAL indicator starts flashing)
2. Press **ENTER** (ARCAL indicator turns off)

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5.0 Maintenance

5.1 Storage & Battery Charging

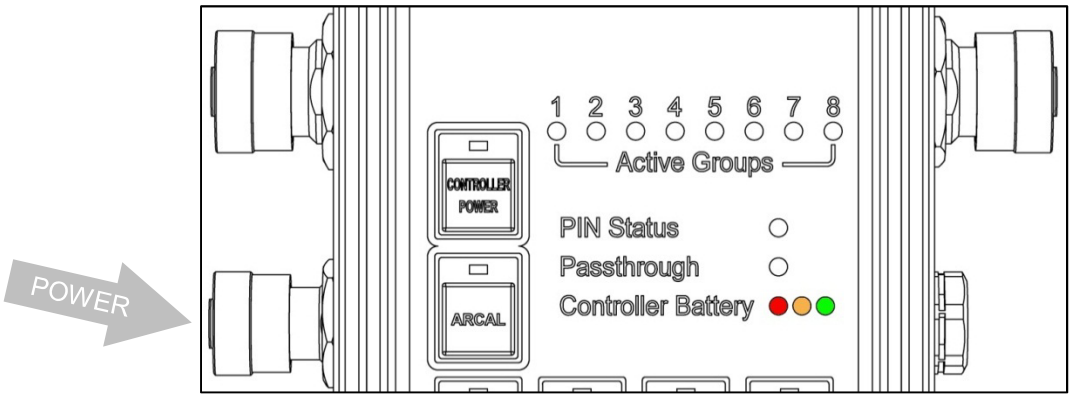
When storing the Handheld Controller, it is important to maintain the battery:

- Press and hold **CONTROLLER POWER** to turn off
- Store in a cool location
- Periodically charge the battery

The battery state of charge is displayed by Controller Battery indicators:

Indicator	Battery State of Charge	
Green	Good, 75 – 100%	No charging required
Amber	Charge, 50 – 75%	Charge next availability
Red	Low, 5 – 50%	Charge immediately
Flashing Red	Critical, < 5%	Charge immediately

A battery charger is included with each Handheld Controller. Plug the battery charger into a 100 – 240 VAC 50/60 Hz wall receptacle and its circular connector into the Handheld Controller's POWER connector:



When properly charging, the Controller Battery indicators will cycle red, amber, and green.

Leave the battery charger connected until the Controller Battery indicator is steady-on green, indicating a full charge.

A full charge each time will maximize the life of the battery.

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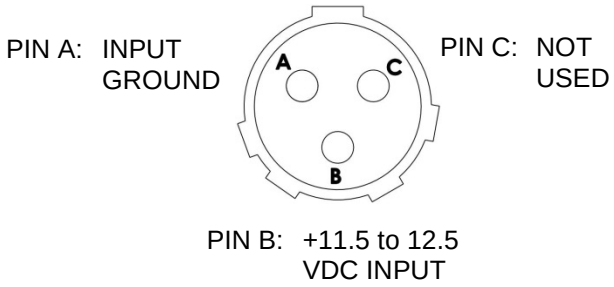
If you want to provide your own power source to the Handheld Controller, follow the mating connector and power requirements:



- MS3116 connector detailed in MIL-DTL-26482 (approved vendor: Amphenol PT06E-8-3P(SR)(025))
- Connector accepts 24 – 20 AWG stranded wire
- +11.5 to 12.5 VDC input @ 1.3 A max.

External power is not a control signal. It cannot be used to control or operate the Handheld Controller.

5.2 Battery Replacement

If a known, good battery charger is connected to the POWER connector and no keypad or charging indicators illuminate, the battery may be too damaged to charge properly.

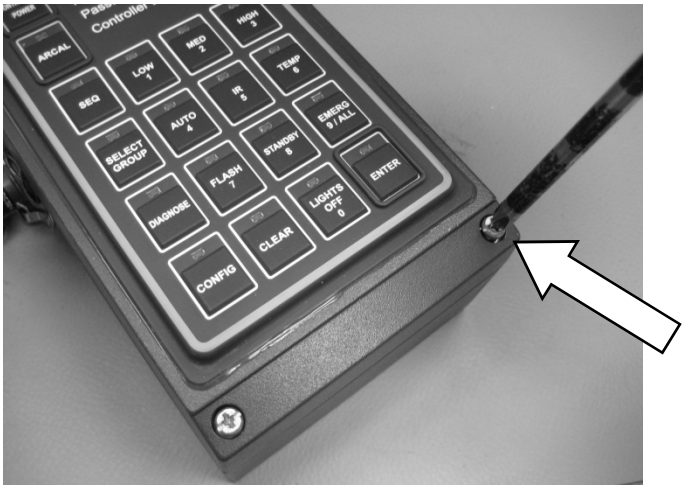
NOTE

The size of the battery changed in 2012, requiring 2005 – 2011 Handheld Controllers to also replace their battery bracket when installing a new battery.

Contact your distributor for your specific replacement battery.

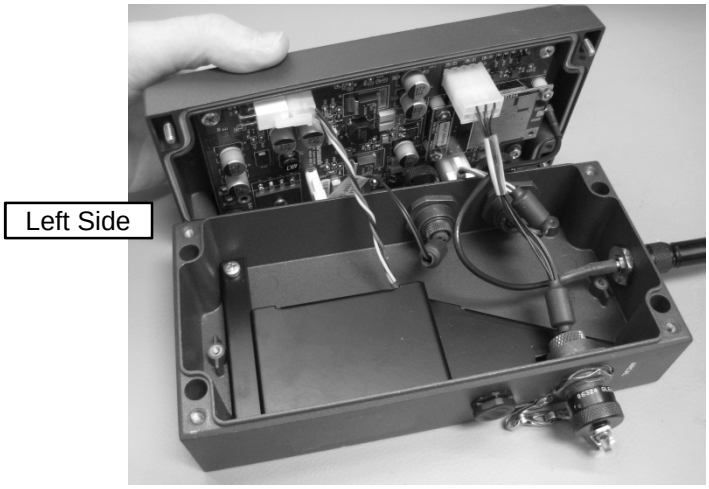
If the battery is permanently damaged and needs to be replaced:

1. Remove the 4 top cover screws using a Phillips #2 screwdriver

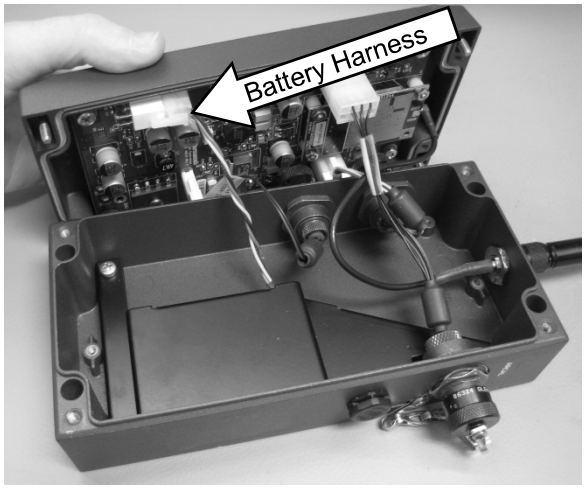


2. Remove the top cover and place on the left hand side of the Handheld Controller, being careful not to damage internal harnesses

Use extreme caution with the metal chassis near the exposed battery terminals and electronics.



3. Disconnect the battery harness being careful not to touch the electronics or damage other harnesses



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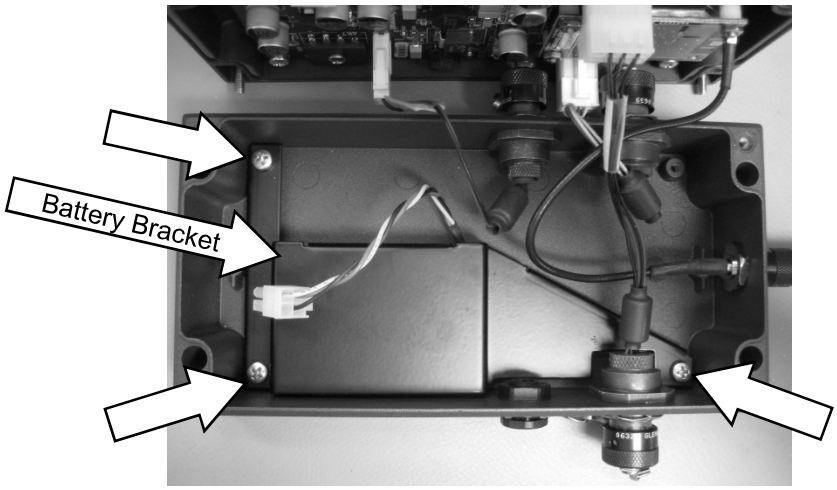
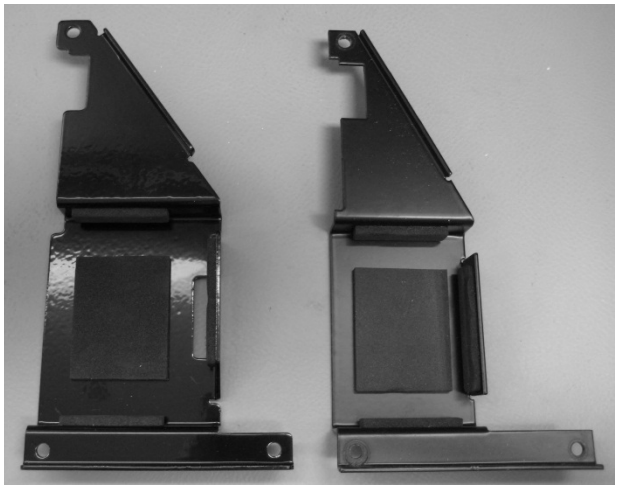
4. Remove the battery bracket's 3 screws using a Phillips #2 screwdriver



5. Remove battery bracket and battery; recycle old battery

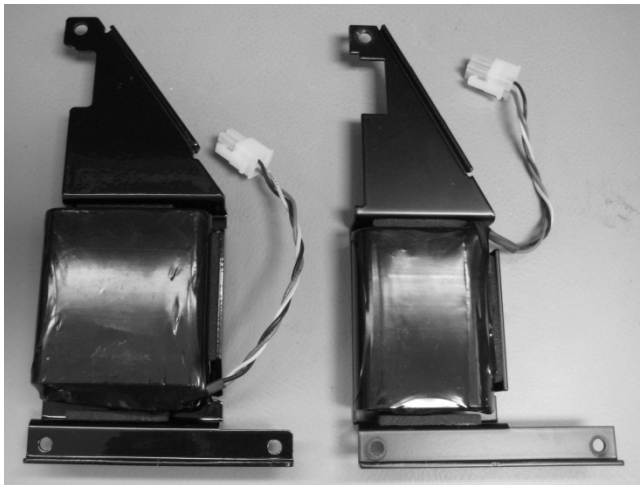
Installing a battery is similar to the above steps:

1. Install new battery into new battery bracket with foam pads



New battery bracket
Foam pads installed

Old battery bracket
Foam pads installed



New battery &
new battery bracket
Harness routes
out bottom slot

Old battery &
old battery bracket
Harness routes
out top slot

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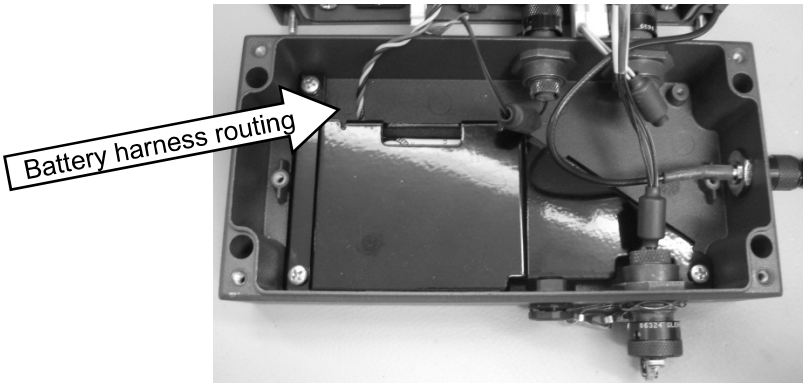
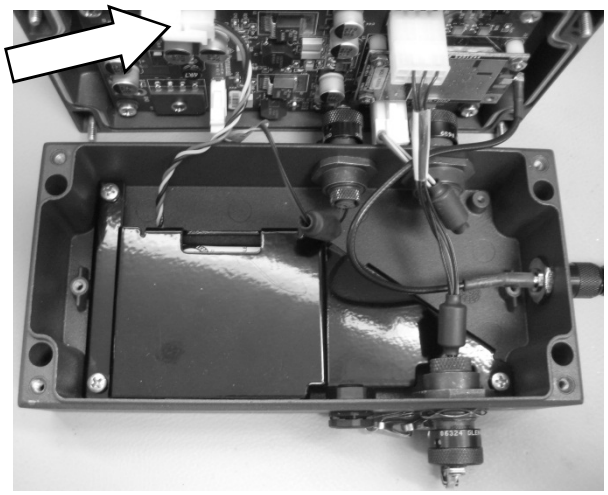
2. Install new battery, new battery bracket, and 3 screws; note battery harness routing. Do not over-tighten screws.



3. Connect battery harness



4. Ensure top cover seal is clean and in place; replace top cover and 4 screws. Do not over-tighten screws.

5. Confirm functionality by pressing CONTROLLER POWER; keypad should illuminate
6. Connect a battery charger to fully charge before use

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5.3 Recycling

This product required the extraction and use of natural resources. It may contain substances that could be harmful to the environment or human health if improperly handled at the product's end of life. In order to avoid release of such substances into the environment and to reduce the use of natural resources, we encourage you to recycle the product in an appropriate way that will ensure most of the materials are reused or recycled appropriately. Check your local municipality for electronics recyclers.

The symbol indicates that this product complies with the European Union's requirements according to Directive 2002/96/EC on waste electrical and electronic equipment (WEEE).

The battery is a rechargeable lithium ion battery. Consult your local laws for information on recycling.

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6.0 Troubleshooting

Symptom	Cause	Solution
Controlled product's output is off Controlled product is unresponsive to wireless control Able to transmit wireless commands	Controlled product's infrared output LEDs are on	De-select the IR key on the Handheld Controller; send a visible output command
	Controlled product is in Storage Mode	De-activate Storage Mode manually: A700 Series — Press push button once A650 — Slide switch to ON SEPS — Press push button once PAPI — Press push button once
	Controlled product's battery state of charge is too low; it has entered Low Voltage Disconnect (LVD) and turned off its output and/or radio	Charge the controlled product's battery
	Controlled product's battery is not connected	Connect the controlled product's battery
Controlled product's output is on or off Controlled product is unresponsive to wireless control Able to transmit wireless commands	Mismatched groups	Ensure the Handheld Controller's and controlled product's group match
	UCS is enabled	Ensure the Handheld Controller's and controlled product's UCS match or turn off UCS
	Environment	Ensure all antennas are connected, there is clear line-of-sight, controlled products are within the possible range, and the Handheld Controller is elevated
Unable to transmit wireless commands	Incorrect PIN entered	Enter the correct PIN to be able to transmit commands
	PIN has been changed and is unknown	Perform a Factory Reset
	Handheld Controller's battery state of charge is too low	Charge the battery using the POWER connector
	Passthrough is enabled	Disconnect harness from RS 232 connector and Passthrough will be disabled
	ARCAL Mode is enabled	Disable ARCAL Mode

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7.0 Warranty

This product is covered by the Carmanah warranty. Visit www.carmanah.com for additional information or to register your product online.

Before contacting Carmanah's customer service department, please have the serial number of your product available, a brief description of the problem, as well as all details of the installation and recharging efforts.

To contact Customer Service:

Mail: Carmanah Technologies Corp.
250 Bay Street
Victoria, BC Canada V9A 3K5

Phone: +1.250.380.0052 (worldwide)
1.877.722.8877 (toll-free, U.S. and Canada)

Fax: 1.250.380.0062

Email: customerservice@carmanah.com

Website: carmanah.com

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8.0 Appendices

8.1 Glossary

AC	Alternating Current
ACGIH	American Conference of Governmental and Industrial Hygienists
ARCAL	Aircraft Radio Control of Aerodrome Lighting
DC	Direct Current
EMS	Energy Management System
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
ICAO	International Civil Aviation Organization
ICES	Industry Canada Equipment Standard
IR	Infrared
ISM	Industrial, Scientific and Medical
LED	Light Emitting Diode
LVD	Low Voltage Disconnect
NVG	Night Vision Goggle
RoHS	Restriction on Hazardous Substances
UCS	Unique Code Sequence
WEEE	Waste Electrical and Electronic Equipment

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8.2 Specifications

Physical	
User Interface	Sealed keypad Variable intensity LED backlight and indicators User and Administrator passwords
Chassis	Powdercoated aluminum chassis, olive drab MIL-spec connectors Waterproof, vented battery compartment Replaceable antenna, RP-TNC connector
Dimensions	14.8 in. (377 mm) height incl. antenna 5.5 in. (141 mm) width incl. connectors 2.6 in. (66 mm) depth
Weight	2.7 lb. (1.2 kg)
Operating Temperature	-40 to 140 °F (-40 to 60 °C)
Storage Temperature	-40 to 140 °F (-40 to 60 °C)
Battery State of Charge	Yes, 3 color indication
Battery Charger	Temperature-compensated External charge connector 100 – 240 VAC 50/60 Hz battery charger included 5 hrs. time to recharge from 0% to 100%
Battery	Lithium ion battery pack Recyclable 12 hrs. continuous use (1 transmission / min.) 13 days standby (controller power on) 52 days storage (controller power off)

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Wireless Control	
Radio	902 – 928 MHz FHSS with encryption 1 W transmission Up to 2.5 miles (4 km) range
Light Control	Visible, infrared, steady-on, and flashing settings Autonomous, Temporary, Standby, Lights Off, and Emergency Modes
Diagnostics	Yes, battery of controlled products
Grouping	Yes, up to 8
Unique Code Sequence (UCS)	Yes, unique keying of controlled products to a specific Handheld Controller
External Control	Yes, Passthrough feature with RS 232 control via external connector
ARCAL Control	Yes, via external connector
Standards and Testing	
Ingress	EN 60529, IP 66 MIL-STD-202G, Method 104A, Test Condition B
Electromagnetic Interference (EMI) & Electromagnetic Compatibility (EMC)	FCC Part 15 emissions & immunity ICES-003 emissions & immunity

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